

## Northwestern Pond Turtle

(*Actinemys marmorata marmorata*)

### Legal Status

*Federal:* None.

*State:* Species of Special Concern.



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*Global and State Conservation Status:* G3G4T3S3: Global Rank, G3G4 somewhere between a G3 = Vulnerable: At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors, and a G4 = Apparently Secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors; T-Rank, T3= Same as global rank G3 but related only to the status of the subspecies throughout its range; State Rank, S3 = Same as global rank G3 but only for the range of taxa within California.

*Recovery Plan:* None.

**Other Common Names:** Northern Pacific Pond Turtle

**Other Related Names:** *Clemmys marmorata marmorata* (Baird and Girard, 1852); *Emys* (= *Clemmys*) *marmorata marmorata* (Baird and Girard, 1852); *Emys marmorata marmorata* (Baird and Girard, 1852)

### Species Description and Life History

The northwestern pond turtle (*Actinemys marmorata marmorata*) (Holman and Fritz 2001, McCord and Joseph Ouni 2006, Obst 2003) is a medium-sized aquatic turtle. Previously assigned to the genus *Clemmys*, Feldman et al. (2002) has also proposed taxonomic realignments that would place *A. marmorata* within the genus *Emys*; current literature may refer to this taxon under either generic name. The carapace (upper portion of shell) color ranges from brown to black (Holland 1994). The carapace may be unmarked or covered with small, fine dark spots or lines (Holland 1994, Stebbins 2003). Adult size ranges from 8.9- to 21.6-cm (3.5- to 8.5-in) straight-line carapace length (Stebbins 2003). The plastron (lower portion of shell) contains six pairs of yellowish shields, usually with dark blotches (Stebbins 2003). The head usually contains spots or a network of black coloring (Stebbins 2003). Adult females have a more domed, taller carapace, as compared to males, which have a more flattened, lower profile carapace (Holland 1994). Males also have larger, thicker tails than females (Holland 1994). Juveniles have a uniformly brown or olive carapace, with yellow markings along the edge of the marginals (the ring of shields encircling the carapace) and a tail nearly as long as the carapace (Stebbins 2003).

Field observations have reported copulation in May, June, and late August (Holland 1988). Oviposition (egg-laying) may occur as early as late April in central California (Rathbun *et al.* 1993) to late July, with most occurring in June and July (Holland 1994). A gravid (pregnant) female approaches the nesting site, empties the contents of her bladder onto the soil, excavates a 90- to 125-mm (3.5- to 4.9-in) deep nest chamber, and deposits 1 to 13 hard-shelled eggs (Holland 1994, Jennings and Hayes 1994). Incubation time ranges from 80 to more than 100 days in California (Holland 1994). In northern California, hatchling northwestern pond turtles (which are about the size of a quarter) overwinter inside the nest chamber and emerge the following spring (Holland 1994). The terrestrial movements of post-emergent hatchlings are poorly understood (Holland 1994), although it is known that at least some move quickly to aquatic habitats.

Adults sometimes engage in extended overland movements, which may be in response to drought or normal movements to aquatic habitats within a home range (Holland 1994). In one study, a turtle was observed making an overland movement of 5 km (3.1 mi), although in all other cases, overland movements were less than 3 km (1.9 mi) (Holland 1994). Such overland movements may be responses to an environmental stress such as drought or may be part of an individual's normal movements within a home range, which may consist of a series of ponds (Holland 1994). In lotic (stream) habitats, individuals move along the watercourse from pool to pool. During the course of one summer, Bury (1972) found average male, female, and juvenile linear movements were 354, 169, and 142 m (1,161, 554, and 466 ft), respectively. In that study, adult males had the largest home ranges (0.98 ha [2.42 ac]), followed by juveniles (0.36 ha [0.89 ac]) and adult females (0.25 ha [0.62 ac]).

### **Habitat Requirements and Ecology**

The northwestern pond turtle, although primarily found in natural aquatic habitats, also inhabits impoundments, irrigation ditches, and other artificial and natural water bodies (Ernst *et al.* 1994) and is found at elevations ranging from sea level to 2,041 m (6,696 ft) (Stebbins 2003). The species is usually found in fresh water, but brackish habitats are also utilized (Ernst *et al.* 1994, D. Holland pers. comm.). The aquatic habitat may be comprised of either mud or rocky substrates and usually contains some vegetation (Ernst *et al.* 1994). Habitat quality often seems to be positively correlated with the number of available basking sites (Jennings and Hayes 1994). Turtles seem to avoid areas lacking in significant refugia (Holland 1994). Basking sites may be rocks, logs, vegetation, terrestrial islands within the aquatic habitat, and human-made debris (Holland 1994). Hatchlings utilize shallow, slow-moving waters with emergent vegetation, such as that found along side channels of stream or pond margins; while juveniles 1 year old or more tend to utilize the same aquatic habitats as adults (D. Holland pers. comm.). Northwestern pond turtles may overwinter in aquatic or upland habitats (Holland 1994). Like the giant garter snake (*Thamnophis gigas*), northwestern pond turtles inhabit the irrigation ditches servicing rice agriculture in the Central Valley (E. Hansen, unpublished notes). While rice fields probably confer little advantage for adult northwestern pond turtles, mature rice probably provides valuable cover and foraging habitat for hatchlings.

When overwintering in aquatic habitats, turtles enter a state of torpor and rest quietly on the pond or stream bottom, often in mud or under some type of refugium such as a log or undercut bank (Holland 1994). Overwintering northwestern pond turtles may move between several sites during winter and have been observed swimming under ice in water temperatures as low as 1° C (34 F) (Holland 1994). Individuals may occasionally emerge to bask on warm, sunny days during winter, even in northern Oregon (D. Holland pers. comm.).

Northwestern pond turtles are generalist feeders, with most food being obtained by opportunistic foraging or scavenging (Ernst et al. 1994). Known food items include algae, various plants, crustaceans, various types of insects, spiders, fish, frogs, tadpoles, and birds (Pope 1939, in Ernst *et al.* 1994; Evenden 1948, in Ernst *et al.* 1994; Carr 1952; Holland 1985; Bury 1986). Scavenging carrion of various vertebrate species may be a locally and/or seasonally important part of the diet (Holland 1994). Neustophagia, (a form of filter feeding) may be utilized to obtain abundant small invertebrate prey such as *Daphnia* (Ernst et al. 1994, Holland 1994).

Upland habitats are also important to northwestern pond turtles for nesting, overwintering, and overland dispersal (Holland 1994). Nesting sites may be as far as 400 m (1,312 ft) or more from the aquatic habitat, although usually the distance is much less and generally around 100 m (328 ft) (Jennings and Hayes 1994, D. Holland pers. comm., Slavens 1995). Nesting sites typically have a southern or western aspect, with slopes of 0 to 46% and compact, dry soils (Holland 1994, Bury et al 2001). When turtles choose to overwinter in upland habitats, individuals typically leave the aquatic habitat in late fall, moving as much as 500 m (1,640 ft) from the aquatic habitat (Holland 1994). Turtles typically burrow into duff (leaf litter) and/or soil, where they remain during the winter months (Holland 1994). For reasons not entirely clear, northwestern pond turtles may move into upland habitats for variable intervals at other times of the year, during which times they may be found burrowed into duff or under shrubs (Rathbun *et al.* 1993).

Raccoons (*Procyon lotor*), bullfrogs (*Rana catesbeiana*), largemouth bass (*Micropterus salmoides*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), and feral and domestic dogs (*Canis familiaris*) are known to be major predators of northwestern pond turtles (Holland 1994). Holland (1994) indicates that other known predators include Osprey (*Pandion haliaetus*), Bald Eagle (*Haliaeetus leucocephalus*), black bear (*Euarctos americanus*), river otter (*Lutra canadensis*) (Manning 1992 in Holland 1994), and mink (*Mustela vison*). Numerous other fish, amphibian, bird, and mammal species are suspected to prey on the species (Holland 1994). Raccoons, in particular, are known to depredate nests, sometimes destroying all nests in an entire communal nesting area (D. Holland pers. comm.).

Northwestern pond turtles spend considerable time basking in order to thermoregulate, preferring body temperatures between 24 and 32° C (75 and 90° F). Turtles seem to avoid body temperatures above 34° C (93° F) and usually cease basking at body temperatures well below their critical thermal maximum of 40° C (104° F). Individuals

often bask above the water level on emergent logs, rocks, rocks, vegetation, or other objects. Turtles may sometimes bask at the surface, however, and sometimes within vegetation—where water temperatures may be 10 to 15° C (18 to 27° F) warmer than the water immediately below (Holland 1994). This type of basking may be utilized when air temperatures become too high for aerial basking (D. Holland pers. comm.). Northwestern pond turtles also spend considerable time foraging (Holland 1994). Foraging may occur during the day or night (D. Holland pers. comm., N. Sisk pers. obs.). Intraspecific (within-species) aggressive interactions, in the form of open-mouth gestures and shoving or bumping to secure positions on basking sites, are also common among northwestern pond turtles (Holland 1994).

Non-native invasive species are a threat to northwestern pond turtles. Bullfrogs and exotic large predatory fish (e.g., largemouth bass) compete for invertebrate prey with northwestern pond turtles and are known to eat hatchlings and small juveniles. Carp alter or eliminate emergent vegetation required as microhabitat by hatchlings (Holland 1994). Exotic turtles, including painted turtles, snapping turtles, and sliders, may compete with pond turtles for food and basking sites (D. Holland pers. comm.). These exotic turtles also may harbor and transmit diseases, such as upper respiratory diseases, to pond turtles (Holland 1994). Cattle trample and eat aquatic vegetation that serves as habitat for hatchlings and may crush nests. Domestic dogs sometimes kill or injure turtles (D. Holland pers. comm.).

### **Species Distribution and Population Trends**

#### *Distribution*

The range of the northwestern pond turtle in North America extends primarily from Pacific slopes of western Washington State (where it may now be extinct) south to the San Francisco Bay area, where it intergrades with the southwestern pond turtle (*C. m. pallida*) (Stebbins 2003). The range of the southwestern pond turtle (which does not occur in the Plan Area) extends from the zone of intergradation with the northwestern pond turtle in central California, south to Baja California Norte, Mexico. Outside California, occurrences east of the Pacific crest include the Truckee, Carson, and East Walker Rivers in Nevada; Drews Creek in Lake County; the Canyon Creek area in Lake County; and introduced occurrences along the Deschutes River at Bend in Deschutes County, Oregon (Jennings and Hayes 1994, Stebbins 2003). In California, the northwestern pond turtle ranges primarily from Pacific slopes along the Oregon-California state boundary south to the San Francisco Bay area (Stebbins 2003). Occurrences east of the crest of the Sierra Nevada Mountain Range include Susanville in Lassen County (Stebbins 2003). Molecular analyses place western pond turtles into four distinct groups, or clades, which include: (1) a Northern clade extending from Washington south to San Luis Obispo County, California, west of the Coast Ranges, (2) a San Joaquin Valley clade from California's Great Central Valley, (3) a Santa Barbara clade from California's Santa Barbara and Ventura counties, and (4) a Southern clade occurring south of the Tehachapi Mountains and west of the Transverse Range south to Baja California, Mexico (Spinks and Shaffer 2005).

Queries conducted in January 2008 of the collection database of the California Academy of Sciences (2008) yielded seven Yolo County records of northwestern pond turtles, all from 1997. Two of those records were from Davis Creek, near Davis Creek Reservoir in northwestern Yolo County. The remaining five records were from the UC Davis Arboretum (n = 1) and Arboretum Waterway (n = 4). Spinks et al. (2003) estimate a naturally occurring population of 53 individuals (95% CI = 48, 66) within the Arboretum Waterway. A similar query of records of the Museum of Vertebrate Zoology (2008) in Berkeley yielded no record of the northwestern pond turtle in Yolo County. The CNDDDB (2007) lists one record from 1990 of multiple northwestern pond turtle individuals along Putah Creek and an unnamed tributary. This site is located less than 1.6 km (1 mi) south-southeast of Winters, along the southern boundary of Yolo County. The CNDDDB reports another occurrence from 2005 within Cache Creek, extending for 5.3 miles between Camp Haswell to an upper regional park, northwest of Capay Valley. A healthy population is also present at the Cache Creek Nature Preserve just west of Woodland (Spinks pers. comm.) Jennings and Hayes' (1994) distribution map shows one other extant occurrence from near the northeast corner of Yolo County and three extant occurrences from the Sacramento River Basin, along the southeastern boundary of Yolo County. At least three northwestern pond turtles were observed within the Willow Slough Bypass between County Road 104 and County Road 105 during 2007 (E. Hansen, unpublished notes). No other records from Yolo County, either extant or extirpated, were discovered.

### *Population Trends*

Populations in Washington State, where the species may be extinct (Stebbins 2003), have likely suffered the most. Stable populations remain in southern Oregon (D. Holland pers. comm.); however, northern Oregon populations have suffered severe declines (Hays et al. 1999), and most populations throughout the range have exhibited some declines (Holland and Bury 1998, D. Holland pers. comm.).

In California, Jennings and Hayes (1994) consider the northwestern pond turtle as endangered from the Mokelumne River south and threatened elsewhere within the state. Loss of habitat is the most significant factor in northwestern pond turtle declines. Over 90 percent of the historical wetlands in California have been drained, filled, or diked to support agricultural and urban development (Frayer *et al.* 1989). Many populations throughout California are heavily adult-biased (D. Holland pers. comm.), an indication that little recruitment is occurring within those populations. In the Central Valley, pond turtles were exploited for food from the 1890s to the 1920s, which is believed to have played an important role in the declines in the San Francisco area and Central Valley (Storer 1930, Hays *et al.* 1999).

It is likely that the northwestern pond turtle once occurred in a relatively continuous distribution within suitable habitat in Yolo County, although there is no known site in the county where extirpation of a population has occurred. The population at the UC Davis Arboretum is characterized by a demographic profile characteristic of senescing

populations, but has been supplemented by at least 33 captive-hatched individuals since 1996 (Spinks et al. 2003). Because the oldest record obtained from the County is from 1990, status changes that may have occurred prior to 1990 would not be evident from an examination of existing records. Moreover, although no extirpations have been recorded at any known occupied sites in Yolo County, recent survey data could not be located, and data on population trends at those sites are lacking. Therefore, with the exception of the UC Davis Arboretum, current status and population trends of the northwestern pond turtle within the Plan Area are unknown.

### **Threats to the Species and Other Conservation Issues**

The most significant threats to the northwestern pond turtle are the continuing loss, degradation, and fragmentation of occupied habitats (D. Holland pers. comm.). Agricultural-related disturbances to wetlands and streams such as changes in the hydrological regime (e.g., water diversions) and removal of aquatic vegetation can render such wetlands unsuitable for pond turtles (D. Holland pers. comm.). The destruction of upland habitats comprising communal nesting areas for agricultural or urban development can result in significant adverse consequences on recruitment for many individuals or an entire population (D. Holland pers. comm.). Water releases from reservoirs, which alter the natural hydrologic regime, may adversely affect downstream habitat by eliminating or altering basking sites, refugia, foraging areas, and hatchling microhabitat (Holland 1991, Hays *et al.* 1999, USFWS 1999). The potential transmission of parasites and diseases from exotic turtle species is a serious concern (Holland 1994, Jennings and Hayes 1994, Hays *et al.* 1999). Exotic turtles released into the wild typically originate from pet stores, where they are often kept in common containers under unsanitary conditions. When reared under such conditions, the potential for harboring and transmitting exotic pathogens and parasites is greatly increased when these diseased or parasite-ridden turtles are released into habitats occupied by pond turtles. Other threats include collection of individuals for the pet trade and shooting or other means of indiscriminate killing by humans (Holland 1994). Extended drought and associated fire can also result in significant mortality of western pond turtles (Holland 1991). Holland (1994) indicated that mortality caused by automobile strikes probably match or exceed mortality from most other anthropogenic sources.

Jennings and Hayes (1994) consider the variation in nesting location in response to variation in habitat, movement responses to habitat change, patterns of movement in the absence of change, and recolonization ability in structurally different habitats to be the most significant data gaps for the species. The lack of data on these parameters led Rathbun *et al.* (1992) to recommend protecting at least 500 m (1,640 ft) from known occupied aquatic habitat to avoid impacts to nesting habitat. No recovery plan has been prepared for California populations of western pond turtles because the species is not listed, but the species is included among the recovery goals and objectives contained in the USFWS's (1999) *Draft Recovery Plan for the Giant Garter Snake (Thamnophis gigas)*, a species that shares the same wetland habitat types as the northwestern pond turtle. The Plan does not propose any conservation measures designed to benefit the western pond turtle exclusively; however, recovery actions (e.g., habitat protection and

restoration) undertaken in the Plan are expected to provide secondary benefits to the species.

Several conservation measures should be implemented in areas where the northwestern pond turtle is known to occur. Populations of exotic predators or competitors, such as bullfrogs, large fish (e.g., largemouth bass), and turtles, should be controlled in habitats occupied by northwestern pond turtles; and efforts to prevent their spread or introduction should be undertaken throughout the Plan Area. Controlling population size and spread of exotic wildlife within Yolo County could also reduce the transmission of infectious diseases to pond turtle populations. Protecting suitable nesting habitat, especially known historical nesting sites, is crucial. Jennings and Hayes (1994) recommended fencing off corridors between aquatic habitats and nesting habitat, and around nesting habitat, in a manner that allows turtle movement to, and from, nesting areas and prevents trampling of nests during incubation. To reduce the incidence of mortality caused by automobile strikes, the construction of new roads near occupied northwestern pond turtle habitat should be avoided when possible. Maintaining a natural flow regime within lotic habitats occupied by northwestern pond turtles is also of considerable importance in maintaining and improving existing habitat conditions. Considering the abundance of suitable aquatic habitat, northwestern pond turtles may be more widely distributed within the Plan Area than indicated by existing occurrence records.

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#### **References**

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**Personal Communications**

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